
Response to the Editor

Dear Editor,

We would like to thank the editor for their continued concern and support regarding the review process. Upon receiving the reviewers' comments, the authors immediately revised the manuscript appropriately in accordance with the requirements, striving to meet the revision criteria. The revised parts are marked in red font in the manuscript for your review. We are grateful to the editor and reviewers for their valuable comments and suggestions, which are conducive to the continuous improvement and enhancement of this research.

Thank you again for your time and kind assistance.

Best regards,
Haoyu Jin

Public justification (visible to the public if the article is accepted and published):

1. After reading the three reviewer's reports one can conclude that the most pressing problem is the mixing of model data results with reanalysis data. This is not valid unless model biases are corrected and alignment is verified.

A potential solution for this problem would be:

- Describe accurately whether bias correction was applied to model outputs. A preliminary validation can be done by computing your statistics on historical CMIP6 on the same baseline period as reanalysis and test whether model vs. reanalysis distributions are statistically indistinguishable (or quantify residual biases).

Response: The authors have utilized the Quantile Delta Mapping (QDM) method to bias-correct the Global Climate Models (GCMs) based on reanalysis data. This ensures that there are no significant numerical deviations between future and historical periods regarding precipitation and temperature. However, the temporal attributes of the precipitation and temperature series are not altered by this correction, which guarantees the accurate extraction of compound heatwave and extreme precipitation events from the series. The revised parts are marked in red font in Section 3.1 of the manuscript for your review.

2. Some equations and definitions are unclear. For each equation you should define all symbols, indices and domains of summations. It is useful to distinguish between event-level metrics (computed per event and then averaged) from period-level metrics (computed across all events in a period).

Response: The authors have appropriately revised the 3 *Methods* section. We have provided detailed explanations for the meaning of each formula and labeled the relevant variables in Figure

1. These changes are intended to facilitate a clearer understanding of the formulas for the readers. The revised parts are marked in red font in the manuscript for your review.

3. Improve your ensemble treatment for model outputs and reanalysis and specify how statistics are aggregated. If possible, quantify between-member variability.

Response: In this study, three reanalysis datasets and four Global Climate Model (GCM) datasets were selected. Given that there are limited datasets providing complete daily precipitation and daily maximum temperature data, we aimed to include as many datasets as possible. The average of the models was adopted as the final output to ensure the robustness of the data. The revised parts are marked in red font in the manuscript for your review.

4. Harmonize terminology, e.g. counts vs. rate, temperature vs. intensity (define intensity accurately).

Response: The authors have unified the units of the calculation results based on the formulas provided in Section 3 (Methods) to ensure that the presented results are clear and accurate. The revised parts are marked in red font in the manuscript for your review.

5. Provide a better background information for the Wilcoxon Rank Sum tests.

Response: The authors have condensed and refined the introduction of the Wilcoxon rank-sum test (WRST). The WRST is a preferred method for testing significant differences in the medians of two sequences, as it does not require the data to follow a specific distribution. This makes it particularly suitable for this study to compare the differences in indices of different extreme events. The revised parts are marked in red font in the manuscript for your review.

6. Provide a better justification for the selection of model and observational data sets.

Response: The authors have made appropriate modifications to Section 2 (Data) to highlight the rationale behind the model selection. The main reason is that these models and reanalysis datasets offer concurrent daily precipitation and daily maximum temperature data, which is essential for identifying extreme precipitation and heatwave events in this research. The modifications are highlighted in red text for your review.

7. Figures require clear labels and consistent units.

Response: In the revised version, the authors have modified all figures in the manuscript to improve their aesthetics and clarity, and have standardized the units and labels. The revised parts are marked in red font in the manuscript for your review.

8. Adding quantitative metrics, regional analysis and deeper interpretation in the results and discussion would enhance your manuscript.

Response: The authors have revised the manuscript to enhance its depth and breadth. We have added a comparative analysis of extreme events across different regions in the Supplement, which enriches and deepens the study's content. The revised parts are marked in red font in the manuscript for your review.

9. Authors need to correct incomplete interpretations and clearly support all claims.

Response: The authors have revised the entire manuscript, striving to ensure that all statements are grounded in factual research and that the content is accurate and clearly conveyed. The revised parts are marked in red font in the manuscript for your review.

10. Substantially revise writing for clarity and scientific precision.

Response: The authors have carefully proofread the entire manuscript to improve the flow and clarity of the text, revising any awkward or unclear expressions. Furthermore, by inviting experts in the relevant field to review the paper, we have further corrected potential errors and deficiencies. The revised parts are marked in red font in the manuscript for your review.